

CLAIMS

1. A multi-signal analyzer comprising:

an AD converter for simultaneously receiving a plurality of time series signals representing physical and chemical phenomena and subjecting the signals to AD conversion;

a delay time calculation unit for calculating the delay time between arbitrary two signals input to the AD converter;

a time axis adjustment unit for advancing or delaying the time axis of one of the arbitrary two signals according to the delay time calculated by the delay time calculation unit, to thereby make the two signals to have the same time axis; and

a data analyzer for performing analysis such as determining a mutual correlation coefficient by comparing the two signals made to have the same time axis.

2. A multi-signal analyzer according to claim 1, wherein the delay time calculation unit comprises:

a delay time generation unit for applying a delay time to one signal;

a correlation calculation unit for performing an integration processing after the one signal delayed by the delay time generation unit is multiplied by the other signal, to thereby determine a mutual correlation function representing a degree of similarity between the two signals; and

a delay time controller for controlling the delay

time in such a way that the value of the mutual correlation function is maximized, to thereby setting the delay time τ at such an instance to be the delay time between the two signals.

3. A multi-signal analyzer according to claim 1, wherein the delay time calculation unit comprises:

an FFT calculation unit for subjecting each of the two signals to a Fourier Transformation processing for transforming a time function to a frequency function; and

an impulse response calculation unit for performing an averaging processing after multiplying the conjugate complex number of the one signal of the two signals subjected to the Fourier Transformation processing by the other signal, to thereby obtain an impulse response output representing a degree of correlation between the two signals;

wherein setting a time at which the value of the impulse response output reaches a peak as the delay time between the two signals.

4. A multi-signal analyzer according to any of claims 1 to 3, wherein the time axis adjustment unit makes the other signal of the signals input to the AD converter to have the same time axis using the time axis of a selected one signal of the signals as a reference.

5. A multi-signal analyzer according to any of claims 1 to 4, wherein the time series signals are signals including a steady state, and at least one of the time series signals

has a delay time of 10 seconds or more as compared with the other signal.

6. A multi-signal analyzer according to any of claims 1 to 5, wherein the time series signals include at least the fuel flow rate, the number of generated torques, the speed, and the amount of exhaust gas of an automobile engine, and a result of analysis of the data analyzer is used to ECU control of the engine.